⓪ PIONEER°
The Art of Entertainment

RMD-V3104U

MULTI VIDEO PROCESSOR 1-Input 4-Output (NTSC)
PROCESSEUR VIDEO MULTI SORTIE á 1 entrées et 4 sorties (NTSC)

Read and understand these "Operating Instructions"
before operating.
Obey all the warnings on the product.

WARNING: TO PREVENT FIRE OR SHOCK HAZARD.
DO NOT EXPOSE THIS APPLIANCE TO RAIN OR
MOISTURE.

English ■

Français ■

IMPORTANT NOTICE:
RECORD THE MODEL NUMBER AND SERIAL
NUMBER OF THIS EQUIPMENT BELOW. THE
NUMBERS ARE ON THE REAR PANEL.

MODEL NO. ___RMD-V3104U___

SERIAL NO. _____

KEEP THESE NUMBERS FOR FUTURE USE.

⚠**CAUTION:** When positioning this equipment, ensure that the
mains plug and socket in are easily accessible.

IMPORTANT

⚠

The lightning flash with arrowhead symbol, within
an equilateral triangle, is intended to alert the
user to the presence of uninsulated "dangerous
voltage" within the product's enclosure that may
be of sufficient magnitude to constitute a risk of
electric shock to persons.

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION:
TO PREVENT THE RISK OF ELECTRIC SHOCK, DO
NOT REMOVE COVER (OR BACK). NO USER-
SERVICEABLE PARTS INSIDE. REFER SERVICING
TO QUALIFIED SERVICE PERSONNEL.

⚠

The exclamation point within an equilateral
triangle is intended to alert the user to the
presence of important operating and
maintenance (servicing) instructions in the
literature accompanying the appliance.

Information to User

Alteration or modifications carried out without appropriate authorization may invalidate the user's right to operate the
equipment.

INTRODUCTION

Thank you for buying this Pioneer product.
Please read through these operating instructions so you will know how to operate your model properly. After you have finished reading the instructions, put them away in a safe place for future reference. In some countries or regions, the shape of the power plug and power outlet may sometimes differ from that shown in the explanatory drawings. However, the method of connecting and operating the unit is the same.

The following symbols are found on labels attached to the product. They alert the operators and service personnel of this equipment to any potentially dangerous conditions.

⚠WARNING
This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.
⚠CAUTION
This symbol refers to a hazard or unsafe practice which can result in personal injury or property damage.

Note to CATV system installer
This reminder is provided to call the CATV system installer's attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

PRECAUTIONS UPON USE ▲

• Power cord precautions ▲

The power cord should be unplugged or plugged into the outlet by grasping the plug and never the cord itself. Pulling the cord or handling with wet hands may result in a short circuit or electric shock.

Do not place the power cord under the unit or any other equipment. Do not pinch the cord between objects, tie to another cord, modify, twist, or place near a heat source or leave in a location of frequent traffic. Otherwise the power cord may be damaged and cause electric shock or a fire hazard.

The power cord should be located away from all heat sources. Melting of the cord coating may result in a fire hazard or electric shock.

Check the power cord periodically. If it is damaged, contact your dealer and replace the power cord.

Use the provided 3P power plug.
This plug has been designed to prevent electric shock in the event of electrical current leakage. Remember to connect this plug to a 3P power outlet.

• Completely plug in the cord ▲

If the cord is connected to an outlet or table tap with loose contact point, it may cause a heating which eventually results in a fire because of the contact resistance of the outlet and plug.
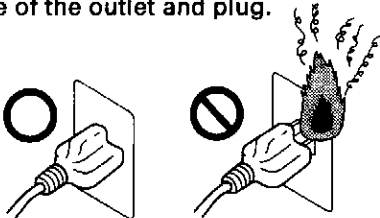
• Use only 100 - 120 V ▲

Use only power supplies with the indicated voltage (AC 100 -120 V). Failure to do so may result in a fire hazard or electric shock.

• Removing dust ▲

If there is dust or metallic objects attached to or near the power plug blades, remove the cord from the power outlet and wipe with a dry cloth. Do not use the plug without cleaning. Failure to clean the plug blades may result in a fire hazard or electric shock.

• When problems occur ▲

Switch off the power and stop using the unit when an abnormal noise, smell, or smoke is detected. This unit should not be used if a malfunction is suspected. Failure to do so may result in a fire hazard or electric shock.
Remember to unplug the power cord from the power outlet and have your dealer check or service the unit.

• Never disassemble the system ▲

Due to the risk of electric shock, the cabinet should only be opened by qualified service personnel. Therefore inspecting, cleaning, and adjusting the unit should be performed by your dealer. Pioneer is not liable for malfunctions or poor performance resulting from modifications by the user.

• When objects fall inside the system ▲

Inserting or dropping foreign metal objects such as wire, pins, paper, or matches may result in a malfunction, fire hazard, or electric shock. If a foreign object enters the unit, turn off the power switch immediately and stop using the unit.
Remember to unplug the power cord from the power outlet and have your dealer check or service the unit.

• When not using for long periods ▲

When not using the system for a long period of time, disconnect the power cable from the electrical outlet.

• Avoid high temperatures and humidity ▲

Do not install the unit in a place subject to direct sunlight, a spotlight, or heat sources such as a heater. For this will adversely affect the cabinet as well as the internal mechanism. Also avoid placing the unit in a place with excessive humidity or dust. Failure to follow these guidelines may result in a malfunction or accident. Also avoid placing the unit where it may be subject to soot, vapor, heat, or moisture.

PRECAUTIONS UPON USE ⚠

• Ventilation (Install in a well-ventilated room) ⚠

The rear panel is equipped with fans to prevent the internal temperature from becoming too high. When installing the unit, take special care not to block the ventilation holes on the front, rear, and bottom panels. If the ventilation holes are blocked, heat cannot escape from inside of the unit and a fire hazard may result. To install the unit in any of the following ways is not recommended:

- • Placing on one side
- • Placing upside down
- • Placing on a carpet or mattress
- • Installing it in direct contact with the floor by removing the feet (insulators)
- • When installing the unit in direct contact with a wall, placing on the rear panel, or in any other unusual way, contact your dealer beforehand.

• Avoid exposure to water ⚠

Do not place a vase, tropical fish basin or glass filled with water on the unit. Should water fall into the unit, turn off the power switch immediately and stop using the unit. Remember to unplug the power cord from the power outlet and have your dealer check or service the unit.

• Care of the product ⚠

To clean this unit, usually wiping with a soft, dry cloth is sufficient. If the unit is extremely dirty, use a soft cloth soaked in a 5x to 6x solution of neutral detergent. Wring out the excess liquid, clean the unit, and then wipe with a soft, dry cloth. Do not use alcohol, thinner, benzine, or insecticide because these substances may remove the surface printing or coating. Also do not leave a rubber or vinyl product in contact with the unit for extended periods of time, for this may damage the cabinet. When using a cloth treated with chemicals for cleaning, read carefully the instructions that were provided with the cloth.
Remember to unplug the power cord from the power outlet before cleaning the unit.

• Condensation

Condensation is one problem which may be faced in the winter season. When the temperature in a room installed with a multi projection unit rises suddenly, condensation occurs on the lens, and as a result, the system may not display its best performance. In such cases, turn ON the power of the system after waiting more an one hour. Another solution is to increase the room temperature slowly.

• Connecting AV Equipment

To ensure reliability, this unit uses a BNC terminal for its video input. When using the connection cable for the RCA terminal, use the RCA→BNC conversion plug.

BNC

RCA   RCA→BNC conversion plug
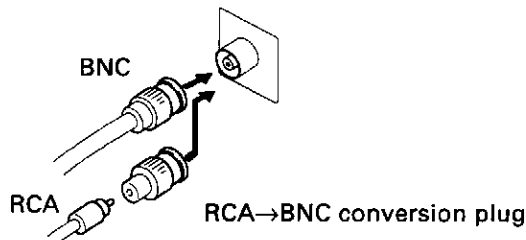
Always use shielded type connection cables.
When connecting cables, be careful not to apply excessive force.
Otherwise the connection terminals may be damaged.

INSTALLATION PRECAUTIONS

When this unit is stacked above or below other components, or mounted in a rack, measures should be taken to prevent the internal temperature of the unit from rising too high.

• Transporting

In transporting the unit, care should be taken to prevent the unit from being shocked, subjected to vibration, or dropped. Also be careful that the unit is not subjected to heat or moisture during transport.

• Installation

This unit should be installed on a level and stable surface. Do not use on an unstable surface and avoid placing heavy objects on the unit.

• Before moving the unit ⚠

When moving the unit after installation, set the power switch to off, unplug the power cord from the power outlet, and make sure to disconnect all cords from this unit.
If the unit is moved without removing the cords, the cords may be damaged and a fire hazard or electric shock may result.

FEATURES

High quality signal processing

Cross-color and dot disturbance are reduced by the motion-compensative type 3D Y/C separation.
Vertical resolution is improved with the motion-compensative type scanning line compensation. Furthermore, quality of expanded images is improved by line compensation.

External Control Function

Frame adjustments, quality adjustments, and various other functions can be controlled by the external computer.

Variable scan board (optional)

The optional variable scan board (RMD-V3020) makes it possible to display an enlarged screen from a computer.
* For more information on using of the variable scan board, please contact your dealer.

RS-232C remote control relay

The connection cable provided with the display can be used to adjust the display through the multi-video processor. ("Display"in the main text refers to RM-V2550U, RM-V2500NA, RM-V2400NA, RM-V5000V, and the RM-V4000V.)

TYPICAL SETUP (AN EXAMPLE OF A SETUP THAT IS POSSIBLE USING THE FACTORY PRESETS)

There are connections between this unit and displays.
① Connect the Y/C outputs to the Y/C inputs of the displays.
② Connect the VBS outputs to the VIDEO inputs of the displays.

To 100 – 120 V
AC inlet

To Video input

From Video output

AV equipment (LVP/VCR, etc.)

Four displays
(Example: RM – V2550U)
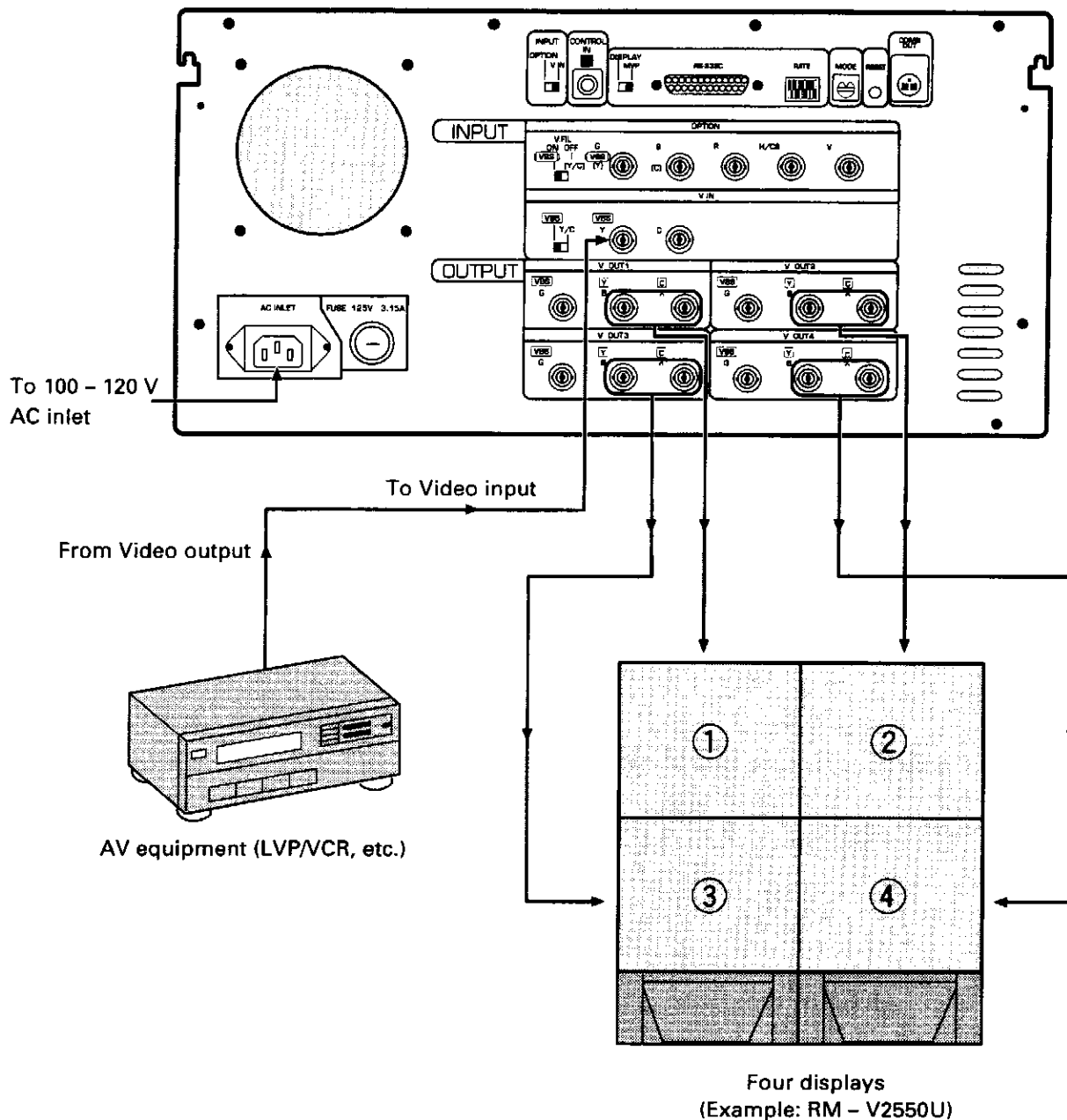
CONTROLS AND CONNECTORS

FRONT PANEL
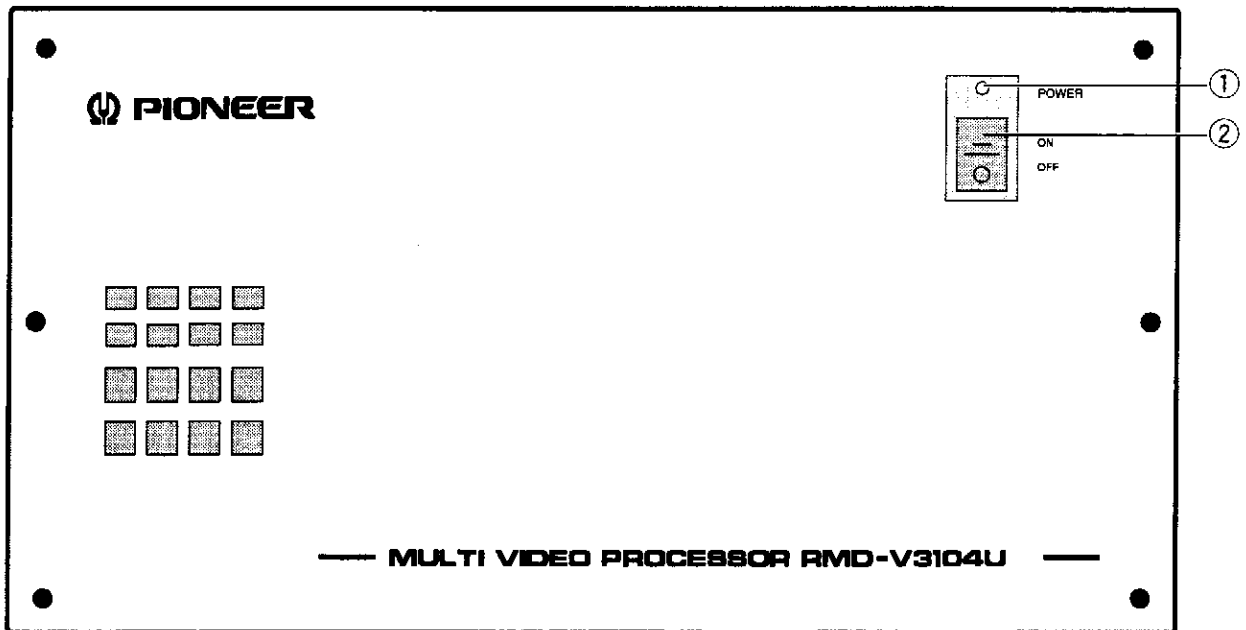
① POWER indicator

Lights when the power is ON.

② POWER switch

Press to switch the power ON/OFF.

CONTROLS AND CONNECTORS

REAR PANEL

① VBS/ Y/C switch

Selects whether the VBS (video signal) or Y/C signals are input to the V IN (Video) input.
The factory preset is VBS (video signal).

② V.FIL (Vertical interpolation filter) ON/OFF switch
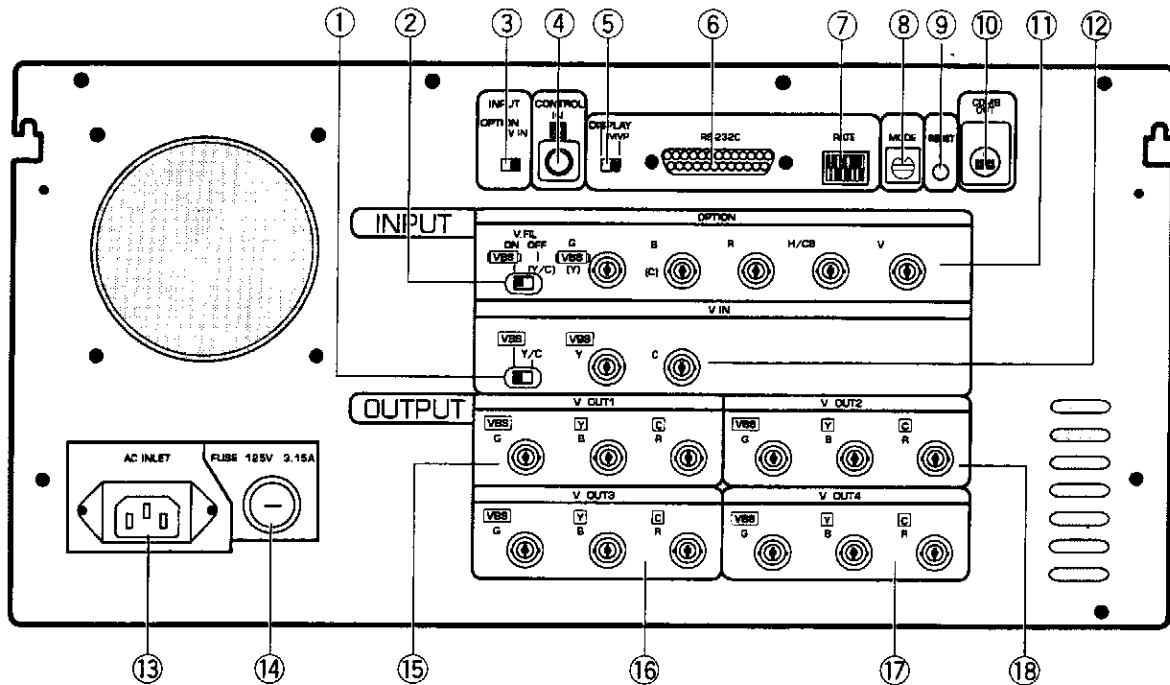
When the optional variable scan board (RMD-V3020) is installed, use this switch to switch the vertical interpolation filter ON/OFF. Set this switch to ON if the top and bottom of the computer screen image cannot be accommodated entirely by the screen.
The factory preset is set to ON.

③ INPUT switch

Selects whether the V IN (Video) or OPTION input is enlarged into 4 screens.
The factory preset is set to V IN.
* **Always press the reset button after changing the position of this switch.**

④ Remote control input connector

Connects the display's remote control unit.
(Adjustment or changes to the settings of the unit cannot be accomplished with the remote control unit.)

⑤ RS-232C switch

When performing adjustments from a computer, use this switch to switch between this unit (MVP) and display (DISPLAY).

⑥ RS-232C connector

Connects RS-232C cable.

< RS-232C connector diagram >
RS-232C pin layout
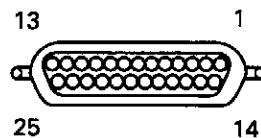
< RS-232C connection diagram >
Use an RS-232C straight cable for connection.

<External computer>		RS-232C straight cable	<MVP unit> RS-232C IN connector	
FG	1		1	FG
Tx D	2	→	2	Rx D
Rx D	3	←	3	Tx D
RTS	4	→	4	RTSI
CTS	5	←	5	CTSI
DSR	6	←	6	DSRI
SG	7		7	SG
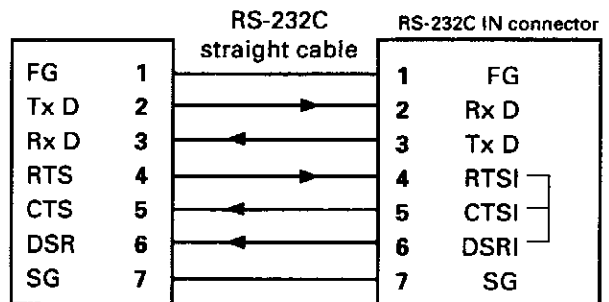
* Pins 4, 5 and 6 are internally shorted.

Pins which are not shown in the diagram are not used.

Signal name

```
FG ...................................... Frame Ground
TxD ............................ Transmitted Data
RxD ................................. Received Data
RTS .............................. Request to Send
CTS ...................................... Cleat to Send
DSR ................................ Data Set Ready
SG .................................... Signal Ground
```

⑦ Baud rate switch

Selects the baud rate for the RS-232C.
Baud rate switch (8-bit DIP switch)

Functions of bits　　▓▓▓ : Factory preset values

Switch No.	Function	ON	OFF
1	Parity	Yes	▓No▓
2	Parity polarity	Even	▓Odd▓
3	Character bits	▓8 bits▓	7 bits
4	Stop bits	2 bits	▓1 bit▓
5	Baud rate setting	See table below.	
6			
7 (Note)	Reserved		▓▓▓
8 (Note)	Reserved	▓▓▓	

```
┌──────────────────────────────────────────┐
│ (Note)                                     │
│   SW7 should always be set to OFF.         │
│   SW8 should always be set to ON.          │
└──────────────────────────────────────────┘
```

Baud rates available with SWs 5 and 6

SW①-5	SW①-6	Baud rate (bps)
ON	ON	19,200
OFF	ON	9,600
▓ON▓	▓OFF▓	▓4,800▓
OFF	OFF	2,400

⑧ MODE switch

Selects the video output mode.

MODE switch details

SW No. *1	Output Mode Details			
	Frequency mode	Output mode	Standard/ double speed *2	Middle cut recovery mode *3
0	NTSC	VBS,Y/C	Standard	OFF
1		RGB		
2			Double speed	
8	NTSC	VBS,Y/C	Standard	ON
9		RGB		
A			Double speed	

*1
The factory preset is "8".

*2
Standard .... Horizontal frequency 15.734 kHz
Double speed ... Horizontal frequency 31.468 kHz
(A multi-scan monitor such as the RMD-V4000V or RMD-V5000V is required to view video that is produced by double speed signals.)

*3
When viewing video that contains rapid movement, there are times when the upper 2 screens do not follow uniformly with the lower 2 screens. This phenomenon is called "middle cutting" and can be alleviated by setting the middle cut recovery mode to ON.

⑨ Reset button

Press this button to reset the system. After the button is pressed, the system enters the manual mode. In manual mode, this unit can be controlled using the rear panel switches, without using a computer.
When the reset button is pressed, this unit functions in the modes selected by the rear panel switches.

⑩ COMB cable connector

Connects the interlock cable (cord with 6P mini-DIN plugs) provided with the display.

CONTROLS AND CONNECTORS

⑪ OPTION video input connectors

These input connectors are used when an option board is installed.
When the RMD-V3020 variable scan board is used, their functions operate as shown below.

G .... Input terminal for the G signal of RGB separate signals.
B .... Input terminal for the B signal of RGB separate signals.
R .... Input terminal for the R signal of RGB separate signals.
H/CS .... Input terminal for the H sync or C SYNC signal.
V .... V sync input terminal.

- As the NEC PC-9800®, IBM PC and DOS/V (VGA) computers use H/V separate sync signals, their sync signals should be connected to both the H/CS and V connectors. H and CS use a common connector.
- Macintosh® computers use the CS sync signal, which should be connected to the H/CS connector.

⑫ V IN (video) input connectors

These connectors receive video data (V IN signal images).
Apply V IN (Video) input signals to these connectors.

VBS/Y ...... Input terminal for the composite video signal or the Y signal of Y/C separate signals.
C .... Input terminal for the C signal of Y/C separate signals.

⑬ AC INLET

Connects the power cord to the unit.

⑭ FUSE

Use only a fuse with the specified capacity.

⑮~⑱ V OUT connectors 1 to 4

These video output connectors output enlarged video image signals for the 4 screens.

VBS/G ...... Output terminal of the composite video signal or the G signal of RGB separate signals. (Also outputs the G On Sync signal while it outputs the G signal.)
Y/B .... Output terminal of the Y signal or the B signal of RGB separate signals.
C/R .... Output terminal of the C signal or the R signal of RGB separate signals.

The correspondence between these outputs and a 4 displays is shown below.

V OUT1	V OUT2
V OUT3	V OUT4

4 displays (front view)

OPTION BOARD RMD-V3020 (VARIABLE SCAN BOARD)

1. Features

(1) Large-screen computer images

By adding the optional RMD-V3020 (variable scan board)* to the RMD-V3104U, computer screen images can be displayed in 4 screens (2 x 2 screens).

(2) Compatible Computer Models

Compatible models include major computers now on the market, for example the NEC PC-9800 series®, IBM PC (DOS/V) in VGA mode, and the Apple/Macintosh® series.

(3) Other functions

• Luminance signal
.... The brightness and contrast can be adjusted.
• Color difference signals (R-Y, B-Y)
.... The clamping levels can be adjusted,

* For more information on using the optional RMD-V3020 (variable scan board), please contact your dealer.

2. Specifications RMD-V3020 (Variable scan board)

The board electrical specifications are based on the main unit specifications.

• Input video signals

Analog R/G/B signals, 0.7 Vp-p (75Ω terminated). After conversion to the Y, R-Y and B-Y signals, each of these signals can be adjusted independently.

• Input sync signals

H/V separate .... TTL level
Composite .... 0.3 to 4 Vp-p, negative logic
G On Sync (Sync On Green)
.... 1.0 Vp-p (75Ω), sync component 0.3 Vp-p (H/V separate signals are given priority in case of simultaneous inputs.)
The sync priority is H, V > CS > G On Sync.

• Input level adjustment items

Y signal brightness, R/G/B signals, gain adjustment
R – Y signal... R – Y cutoff level adjustment
B – Y signal... B – Y cutoff level adjustment

• Tracking adjustment

Tracking (clock phase) can be adjusted.

• Built-in synchronizer

When the option board is combined with the RMD-V3104U, the board synchronizes with other input signals.

• Display range switching

① When the vertical interpolation filter is OFF
With models with 480 V lines <IBM-PC (DOS/V) VGA mode, Macintosh®>, the upper and lower parts of the screen are cut on the screen.

② When the vertical interpolation filter is ON
The number of vertical lines of the above mentioned models is converted so the entire image can be displayed on the screen.

TROUBLESHOOTING

What seems to be a malfunction is not always so. In case of trouble, first check the list of common problems in the following table. Equipment connected to the unit can also cause problems, therefore it is necessary to check all this equipment as well. If the problem is not resolved after performing the recommended steps above, please contact your dealer.

Problem	Cause	Remedy	Ref. Page
Power cannot be turned ON.	The power cord is unplugged from the power outlet.	Insert the power cord into the power outlet.	6
Images are not displayed.	The unit is not correctly connected to other equipment.	Connect it correctly with other equipment.	6, 8
	An incompatible signal is being sent to the unit.	Apply a compatible signal to the unit.	12
	The INPUT switch is not properly set.	Properly set the INPUT switch and press the reset button.	8
	The MODE switch is not properly set.	Properly set the MODE switch and press the reset button.	9

Note on the input signal

The image may not properly display if any of the following types of signals are input.

• VCR signal obtained after repeated dubbing (copies).

• VCR or DVD signal containing copy guard signals.

• Signals other than the V IN standard signal.

Notes on the input image

1. Colored letters (characters) or letters with a colored background may become hard to read due to the blurring of colors. (Therefore it is recommended that these letters (characters)and backgrounds not be used.

2. Horizontal lines consisting of finer lines may become hard to view due to flickering.

Note on genlocking

This unit does not incorporate the genlocking function. This means that the output signals from this unit are not synchronized with the signals input to this unit.

SPECIFICATIONS

Multi-Video Processor RMD-V3104U

Input signals

Input video signal system .... BNC connectors
  ① Composite video signal
    .... 1.0 Vp-p (75Ω)
  ② Y/C separate signals
    Y (with sync) .... 1.0 Vp-p (75Ω)
    C .... 0.286 Vp-p (75Ω)

* Either signal format ① or ② can be selected.
* One RGB input system can be added by using the optional RMD-V3020 (variable scan board).

RS-232C control input .... 25-pin D-SUB

Output signals

4 output video signal systems .... BNC connectors
  ① Composite video signal
    .... 1.0 Vp-p (75Ω)
  ② Y/C separate signals
    Y (with sync) .... 1.0 Vp-p (75Ω)
    C .... 0.286 Vp-p (75Ω)
* Both signal formats ① and ② are output simultaneously.
  ③ RGB signals
    RGB (G On Sync) .... 0.7 Vp-p

Other

Power supply .... 100 – 120 V AC, 60 Hz
Power consumption .... 100 W
Operating temperature/humidity range
  .... 5 to 35 °C (41°F – 95°F), no more than 85%
                                          (without condensation)
Dimensions .... 377 (W) x 382(H) x 204(D) mm
Weight .... 12 kg

Accessories

Owner's manual 1
Power cord 1

* In order to improve products, the specifications above and the external design are subject to change without notice.

CHAPTER 7. MVP MANUAL

1. INTRODUCTION

The multi video processor (hereafter referred to as MVP below) is equipped with a serial interface conforming to RS-232C standards which can be connected to computers.
This manual is required when connecting the MVP to the external computer and controlling adjustments and performance.

This manual describes the methods of using the RS-232C interface, command protocols, and basic functions and commands of the MVP.
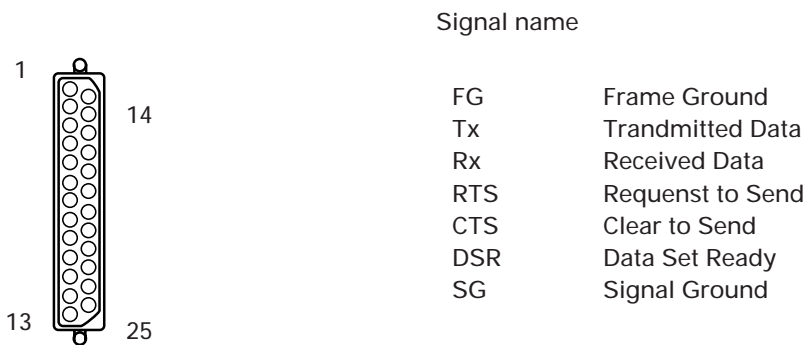
2. CONNECTION WITH MVP EXTERNAL COMPUTER

- Refer to Chapter 4.(P.105) "External Control by MPJ RS-232C" for how to adjust the MPJ.
- ● Use a RS-232C straight cable.
- ● Refer to the following diagram for connections.

● MVP RS-232C Settings

Baud rate	: 2400, 4800 , 9600, 19200
Bit number	: 7, 8
Parity	: NON , ODD, EVEN
Stop bit	: 1 , 2
▭	: Setting at shipment

This setting can be changed using the DIP switches on the panel.
Refer to "Chapter 2.(P.19) MVP panel ⑦ Baud rate switch".

<MVP RS-232C Pin Layout>

Signal name

FG	Frame Ground
Tx	Trandmitted Data
Rx	Received Data
RTS	Requenst to Send
CTS	Clear to Send
DSR	Data Set Ready
SG	Signal Ground

1
14
13
25

Connection with External Computer

<External Computer Side>   <Video Processor Side>
        Straight   RS-232C IN

External Computer			Video Processor	
FG	1		1	FG
TxD	2	→	2	RxD
RxD	3	←	3	TxD
RTS	4	→	4	CTSI
CTS	5	←	5	RTSI *
DSR	6	←	6	DSRI
SG	7		7	SG
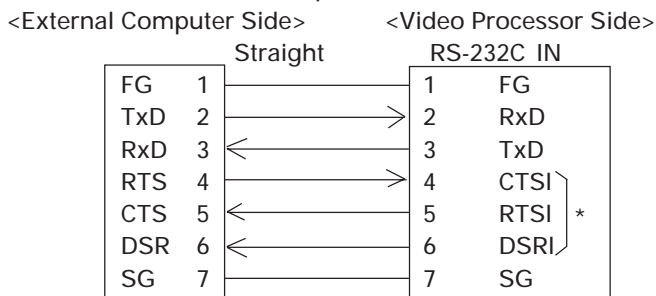
* Pins 4, 5 and 6 are short-circuited inside.
  Pins not shown in the diagram are NC.

3. INSTRUCTIONS FOR USING A COMPUTER AS A TERMINAL

\<When the IBM-PC/AT is used\>
- Use commercially available communications software.
- Use PC-DOS internal commands (TYPE, COPY, etc.)
  Pay attention to use because only one-way transmission of data is possible in this case.

\<With the PC-9800 series\>
- Use commercially available communications software (CCT 98, etc.)
- Use the MS-DOS commands (TYPE, COPY, etc.)
  Pay attention to use because only one-way transmission of data is possible in this case.

\<Example of a program GW-BASIC\>

```
100   OPEN ″COM1:9600, N, 7, 1″ AS#1
110   ON COM1 GOSUB * RCV
120   COM1 ON
130   * LOOP
140        A$=INKEY$:IF A$=″″ THEN * LOOP
150        PRINT#1,A$;
160        GOTO * LOOP
170   * RCV
180        IF LOC(1)<>0 THEN PRINT INPUT$(LOC(1),#1);
190   RETURN
```

\<Communication mode settings in use of CCT98\>
Set the CCT98 communication mode before executing the MVP commands.
After starting up CCT98,

F6 .... Enter the parameter setting mode.
Set the following items as follows.

Communication speed	2400	4800	9600	19200
Character length	7 bits	8 bits		
Stop bit	1 bit	2 bits		
Parity bit	None	ODD	EVEN	
Character code	NEC			
Transmission carriage return code	CR			
Reception carriage return code	CR			
SI/SO control	None			
X control	None			

Selectable (Communication speed, Character length, Stop bit)

Fixed (Parity bit, Character code, Transmission carriage return code, Reception carriage return code, SI/SO control, X control)

.... MVP setting at shipment

* Problems may occur in signal transfer at 2400 bps when adjusting the optional variable scan board.
* Refer to the CCT98 manual for how to use the CCT98.

4. OPERATING MODES

1. Normal mode   : This mode is set when the power and reset switches are pressed.
This makes the panel switch effective and sets the performance mode according to the switch settings.

2. Operation mode : Mode which enables MVP from the external computer.
This mode is set when the ! command is transmitted after connecting the computer.
The normal mode can be set according to the command used.

```
                                              !
  ┌───────────┐      ┌───────────────┐  ───────►  ┌───────────────┐
  │ Power ON  │ ───► │  Normal mode  │            │ Operation mode│
  └───────────┘      └───────────────┘  ◄───────  └───────────────┘
```

            @8 (OPTION input 4-screen enlarged)
            @9 (V IN input 4-screen enlarged)
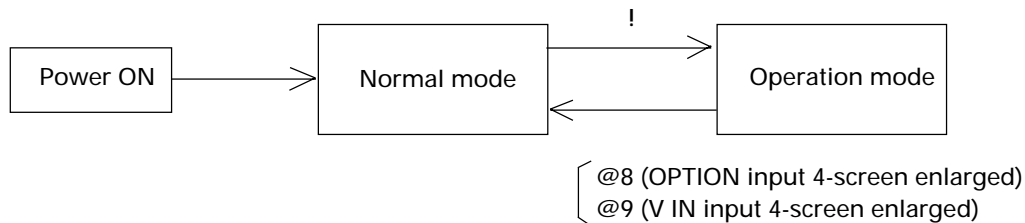
3. Manual mode   : Mode in which the panel switches are effective.
Both the 1 and 2 modes are set to this mode normally.

4. Remote mode   : Mode in which the panel switch functions can be controlled from the computer in the optional mode.
During this time, the panel switch state will be ignored.
<u>Take note that switch settings and operations will not correspond in this mode.</u>
This mode can be changed to the manual mode according to the commands.
For details, refer to the RMT and MNL commands.
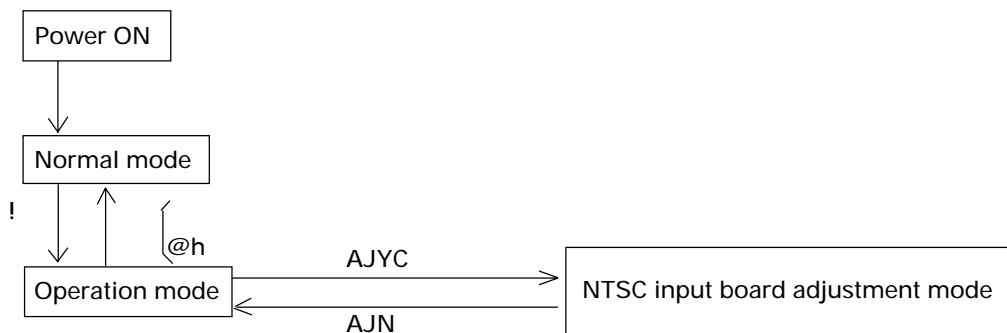
5. Adjustment Mode
   ● NTSC Input Board Adjustment Mode:

   Mode in which the adjustment commands of the NTSC input board can be executed.
   (Adjustment items of the output board can be executed when desired)
   To end the adjustment mode, input AJN.

   Operation mode
   AJYC Enables the NTSC input board to be adjusted.
   AJN   Adjustment mode end

```
      ┌─────────────┐
      │  Power ON   │
      └──────┬──────┘
             │
             ↓
      ┌─────────────┐
      │ Normal mode │←──────┐
      └──────┬──────┘       │
   !         │    ↑         │
             ↓    │@h       │
      ┌─────────────┐   AJYC      ┌──────────────────────────────────┐
      │ Operation mode│──────────→│                                  │
      │             │            │  NTSC input board adjustment mode │
      └─────────────┘←───────────│                                  │
                         AJN      └──────────────────────────────────┘
```

   ● Variable scan board adjustment mode:

   This is the mode for enabling communications with the optional variable scan board.
   In this mode only the variable scan board adjustment commands are accepted. The switches on the front panel will also not function.
   Note that the image output will be disturbed in particular when the Mode switch is operated. Set the switch properly after the communications mode is exited.

   In the operation mode:
   : A   Mode for communications (adjustment) with the variable scan board set.
   :   Variable scan board adjustment mode exited.

5. MVP VIDEO OUTPUT MODES

● The video output formats set by the mode switches are as shown in the following table.
  (At shipment, the mode switch value is set to "8".)

Mode switch No.	Bus format	Output format	Sync signal frequency	Dropout reduction function
0	NTSC	VBS, Y/C	Standard speed	OFF
1		RGB		
2			Double speed	
3	Reserved			
4				
5				
6				
7				
8	NTSC	VBS, Y/C	Standard speed	ON
9		RGB		
A			Double speed	
B	Reserved			
C				
D				
E				
F				

● Bus format   : NTSC .... NTSC digital signal transmission method.
● Output format   : VBS (VIDEO signal), Can be switched between Y/C and RGB.
                            However, VBS and Y/C can only be used for the standard speeds.

● Sync signal frequency   : Standard speed .... Horizontal 15.734 kHz, vertical 59.94 Hz interlace
                          : Double speed .... Horizontal speed 31.469 kHz, vertical 59.94 Hz non-inter-
                            lace

● Dropout reduction function: Function for alleviating dropout due to the scanning line structure particular to
                            multi vision systems

NOTE:
With the RMD-V2550U, only standard speed input is possible. Double speed signals can not be displayed.

6. ADJUSTMENT FUNCTIONS

MVP enables the input and output boards to be adjusted and set by connecting the external computer. The following are items which can be set.

(1) MVP settings
- For adjusting the picture frame (output image position) (Coarse adjustments:Refer to &P, &Q command, fine adjustment:&G command), and correcting the joinings of the magnified screen.

(2) NTSC input board setting
- Bright adjustment (Refer to BRT command)
- Color correction (Refer to COL command)
- Tint adjustment (Refer to TNT command)

(3) Variable scan board settings
- For adjusting the screen display position (Refer to HPS, VPS, HWN, VWN, HWD, VWD commands)
  Sets the variable scan board position to the correct position on the screen.

- Tracking adjustment (Refer to TRK command)
  For correcting lateral vibration of displayed characters, shaking, and tracking noises.

- Full dot number adjustment (Refer to HFD command)
  For correcting vertical bit lines of displayed characters and pictures with high resolution.
  (Normally, the full dot number need not be changed.)

- Blanking frame bright adjustment (Refer to BKL command)
  For setting the luminance level of the blanking frame for decreasing burning when there are blanking frames in the surrounding area.
  Take note that of the effective display range of the PC screen and blanking frame position are not accurate, this adjustment will on the contrary have negative effects.

- Vertical filter conversion rate setting (Refer to LCV command)
  For correcting the aspect ratio, etc.
  However, the vertical resolution deteriorates according to the compensation rate.

- RGB gain adjustment (Refer to RGN, GGN, and BGN commands)

- R–Y, B–Y clamp level adjustment (Refer to RLV, BLV commands)

- Contrast adjustment (Refer to CNT command)

- Bright adjustment (Refer to BRT command)

7. PICTURE FRAME ADJUSTMENT PROCEDURES

Adjust the MVP picture frame as follows.

(1) Connect the RS-232C cable to the MVP panel.

(Refer to (P.141) "Connection with MVP external computer".)

(2) Initialize the picture frame data in RAM.

ex. &L0 ⏎ (Refer to &L command.)

(3) Set to the magnified screen to be adjusted.

ex. M11C22 ⏎ (Refer to the M command, @ command.)
    (@9 ⏎)

(4) Perform coarse adjustment of the picture frame.

ex. &P21 ⏎ ++−−⏎ (Refer to the &P command.)

(5) Perform fine adjustment of the picture frame.

ex. &G0 ⏎ LLRU ⏎ (Refer to the &G command.)

(6) Repeat steps (4) and (5) for every position on the screen.

(7) Save the adjustment data in the EEPROM.

ex. &W1 (Refer to the &W command.)

1. Command reference

(1) To shift to the operation mode [! command]

Input:　　　! ⏎
Explanation: By executing this command when the power is on, various commands can be executed.

(2) To set different screens for adjusting convergence [DFFC command]

Input:　　　DFFC⏎
Explanation: • By executing this command, the V IN input image will be displayed on a single 1x1 display.
　　　　　　　• Use the crosshatch, etc. for V IN input images.
　　　　　　　• For convergence adjustment, refer to the MPJ's adjustment items.

(Returning to 4-screen enlarged display)
　　　　　　　• The V IN input image is set to 4-screen enlarged display by @9⏎. (For the @ commands, refer to
　　　　　　　　page 148.)

(3) To set the system back to 4-screen magnification [@ command]

Input: @h ⏎ (h=8 or 9)

Explanation: • For setting the system back to 4-screen magnification after convergence adjustment, etc.

           • Used also when the normal 4-screen magnification output cannot be obtained due to incorrect operations, etc.

              @8 ⏎ .... (Sets 4-screen magnification of the OPTION input)

              @9 ⏎ .... (Sets the 4-screen magnification of the V IN input)

NOTE) An input board must be added in order to display the image of the OPTION input. (Option)

2. Adjusting the picture frame

(1) To perform fine adjustment of the picture frame [&G command]

Input: &G h ⏎

Explanation: • Performs fine adjustments of the picture frame of the screen specified by the parameter h value.

            h : VOUT output No. (0 to 3)

         The parameter h value is as shown in the following figure when viewed from the front.

0	1
2	3

       • Picture frame fine adjustment command. If the picture frame moves considerable, first perform coarse adjustments of the picture frame using the &P2 command and &Q2 command. (Refer to page 149.)

         When &Gh is executed, the following is shown on the computer display.

         &G3⏎ (Bottom right screen of 4-screen)

         +F –F: The horizontal and vertical adjustment values are output at the +F and –F positions.

         ▭▭▭ : Input the following commands after ▭▭▭ .

             0   : To reset the picture frame fine adjustment data

             L   : To move the screen to the left

             R   : To move the screen to the right

             U   : To move the screen up

             D   : To move the screen down

             ⏎   : Ends the adjustment mode

• **Note:** *For details of the picture frame adjustment procedure, refer to "Picture Frame Adjustment Procedure".*

• **Note:** *To end the adjustment, be sure to input ⏎ .*

       If ⏎ is not input, commands input thereafter may not be executed.

• **Note:** *If the power is cut in this state, the new screen start position data will not be saved. To save the data, execute &W1 ⏎ . (Refer to the &W command.)*

(2) To perform coarse adjustments of the picture frame [&P2, &Q2 commands]

Input: &P2$d_2$$h_1$$h_2$$h_3$, &Q2$d_2$$h_1$$h_2$$h_3$ ⏎

Explanation: &P2 command: Horizontal direction

&Q2 command: Vertical direction

d_2 : Screen position (1 to 2)

$h_1$$h_2$$h_3$: crew start position data (&P2:000 to 1C5, &Q2:000 to 20A)

Although the data is an absolute value, the relative value with the current data can also be specified.

• Input: &P2d_2 ⏎ + ⏎ , &P2d_2 ⏎ – ⏎

&Q2d_2 ⏎ + ⏎ , &Q2d_2 ⏎ – ⏎

d_2 : Screen position (1 to 2)

+ : Left direction (horizontal), and up direction (vertical) looking at the screen.

– : Right direction (horizontal), and down direction (vertical) looking at the screen.

⏎ : Adjustment mode end

&P2d_2 ⏎

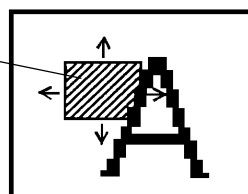***   : Input the current value at ***

+–+– ⏎

&P2d_2 ⏎

***

RES ⏎   : RES is the initial value

&P2d_2 ⏎

***

100 ⏎   : Input the value after checking the current value

• The screen start position is the position of the screen actually displayed in respect to the magnified image.

Position displayed on the screen

Magnified image

• This command is used for the coarse adjustment of the picture frame when the adjustment range is exceeded with the &G command.

• The data shift amount is greater than the &G command.

• Execute &W0 ⏎ to initialize. (Refer to &W command.)

• **Note:** *For details of the picture frame adjustment procedure, refer to ''Picture Frame Adjustment Procedure''.*

• **Note:** *To end the adjustment, be sure to input ⏎.*

If ⏎ is not input, commands input thereafter may not be executed.

• **Note:** *If the power is cut in this state, the new screen start position data will not be saved. To save the data, execute &W1 ⏎. (Refer to the &W command.)*

(3) To store the picture frame data [&W command]

Input :   &W0, &W1
Explanation : &W0 : Sets the saved values to the settings at shipment.
                    (Load data using the &L command.)
             &W1 : Saves the value adjusted.

    • The parameters saved by the &W command are as follows.
        • Picture frame data (Data changed by the &G command.)
        • Screen start position data (Data changed by the &P2 command and &Q2 command.)

• **Note :** When this command is executed, the setting will be saved even if the power is turned off.
        Therefore, all precious settings will be erased.

(4) To load the picture frame data [&L command]

Input :   &L0, &L1
Explanation : &L0 : Loads the picture frame data set at shipment on the RAM.
             &L1 : Loads the picture frame data saved at the end on the RAM. (Data when power is turned on)

    • The parameters loaded by the &L command are as follows.
        • Picture frame data (Data changed by the &G command.)
        • Screen start position data (Data changed by the &P2 command and &Q2 command.)
    • Use this command to reference the adjustment data temporarily.

3. To switch the image input [IFF command]

Input: IFFa ⏎

Explanation: Switches between the V IN input 4-screen enlarged display and the OPTION input 4-screen en-
                    larged display.

a: Image input (A or C)
    A: OPTION input image display
    C: V IN input image display

Example)

IFFA ⏎


```
1  2  3  4 5 6  7  8  9
A  B  C  D E F  G  H  I
```

RGB
Personal
computer

IFFC ⏎

LD
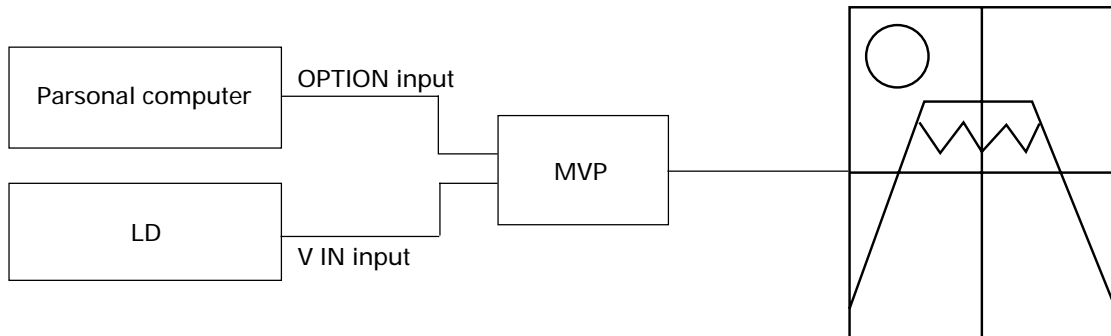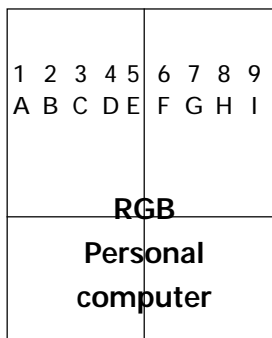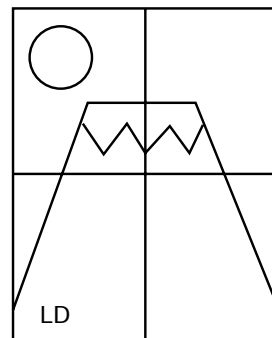
* Refer to the @ command (page 148) if the normal 4-screen magnification cannnot be set due to incorrect
   operations.
* An input board must be added in order to display the image of the OPTION input. (Option)

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4. To indicate the current MVP state [SYS command]

Input: SYS ⏎
Explanation: The current MVP state is shown when SYS ⏎ is input.

```
            (Example)
            RMD-V3000 Series PROGRAM Ver. 1.00A
            ID      0 ─────────────────────────────    This is displayed continuously.
            MODE  8
            DEMO  8
            GEN LOCK INTERNAL
            MANUAL MODE
            L2 INPUT        :    V.SCAN BOARD
            L3 INPUT        :       NO BOARD
            L4 INPUT        :    NTSC BOARD    STANDARD MODE VBS  ┐
            L5 INPUT        :       NO BOARD                       ├─ This is displayed
            L6 OUTPUT       :    4 OUT BOARD                       │   countinuously.
            L7 OUTPUT       :       NO BOARD                       │
            L8 OUTPUT       :       NO BOARD                       │
            L9 OUTPUT       :       NO BOARD                      ┘
```
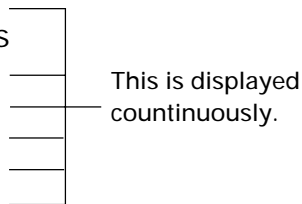
```
            (Contents)
            RMD-V3000 Series PROGRAM | Ver. 1.00A | *1
            | ID       0 | *2
            | MODE  8 | *3
            | DEMO  8 | *4
            | GEN LOCK INTERNAL | *5
            | MANUAL MODE | *6
    *7      | L2 | INPUT        :    | V.SCAN BOARD | *8
            L3 INPUT        :       NO BOARD              *9          *10
            L4 INPUT        :    NTSC BOARD      | STANDARD MODE | VBS |
            L5 INPUT        :       NO BOARD
            L6 OUTPUT       :    | 4 OUT BOARD | *11
            L7 OUTPUT       :       NO BOARD
            L8 OUTPUT       :       NO BOARD
            L9 OUTPUT       :       NO BOARD
```
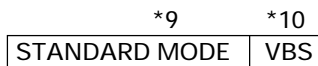
*1 : Program version information
*2 : ID No. selection switch setting
*3 : Mode switch setting
*4 : Input video switch setting

      (8 : 4-screen magnification by optional RGB input board)

      (9 : 4-screen magnification by NTSC input board)

*5 : GEN LOCK internal and external displays

     GEN LOCK INTERNAL: Internal synchronization (normally fixed at internal synchro-

              nization)

*6 : Display of remote and manual states
                             REMOTE MODE   : Remote state
                             MANUAL MODE   : Manual state
*7 : Slot number
*8 : Type of input board
                             NTSC BOARD   : NTSC input board
                             V.SCAN BOARD   : Variable scan board (option)
                             NO BOARD   : No input board is incorporated
*9 : NTSC input board state
                             STANDARD MODE   : When standard NTSC signal is input
                             NO STANDARD MODE : When non-standard NTSC signal is input
*10: Display of VBS/ Y/C select switch state
                             VBS   : Composite video signal input (Indicates V FIL.ON for the V.SCAN BOARD)
                             Y/C   : Y/C separation signal input (Indicates V FIL.OFF for the V.SCAN BOARD)
*11: Type of output board
                             4 OUT BOARD   : 4 output board
                             NO BOARD   : No output board is incorporated

5.   To perform NTSC input board picture quality adjustment

(1)   To set the adjustment mode [AJYC command]

(2)   To exit the adjustment mode [AJN command]

Input: AJYC ⏎, AJN ⏎
Explanation: AJYC command : Sets the NTSC input board to the adjustment mode.
                AJN command   : Exists the adjustment mode.

        · When adjusting the NTSC input board, the adjustment command will be ignored if AJYC is not executed.
        * To set the optional variable scan board to the adjustment mode:
                             : Use the :A command. (Refer to page 156 and on.)

(3) Bright compensation [BRT command]

Input:　　　　BRTd ⏎

Explanation: Corrects the brightness of the NTSC input board.

　　　　　　d　　　　: Compensation value 0 to F

　　　　　　BRTd ⏎　: Displays the current value and moves to the sub command mode *

　　　• To execute this command, it is necessary to set the adjustment mode by AJYC. (Refer to the AJYC command.)

　　　• The changed value will be memorized the last.

　　　(Example) BRT3 ⏎　　Sets the bright level to 3.

　　　＊Sub command mode of BRT command

　　　　　　　　The sub command mode is set by BRT ⏎.

　　　　　　　　(Example) BRT3 ⏎

　　　　　　　　　　　　　　*

　　　　　　　　　　　　　▇

　　　　　　　　* indicates the current value.

　　　　　　　　Input + and − at the ▇ cursor position.

　　　　　　　　Always input ⏎ (CR) to end.

(4) Color compensation [COL command]

Input:　　　　COLd₁d₂d₃ ⏎

Explanation: Corrects the color of the NTSC input board.

　　　　　　$d_1d_2d_3$　　: Compensation value 0 to 255

　　　　　　COL? ⏎　: Help display

　　　　　　COL ⏎　　: Displays the current value and moves to the sub command mode

　　　• To execute this command, it is necessary to set the adjustment mode by AJYC. (Refer to the AJYC command.)

　　　• If data input is skipped, the sub command input mode is set after the data is displayed.

　　　COL sub command mode

　　　　　　　　The COL sub command mode is set by COL ⏎.

　　　　　　　　(Example) COL ⏎

　　　　　　　　　　　　　***

　　　　　　　　　　　　▇

　　　　　　　　*** indicates the current value.

　　　　　　　　Input the following sub command at the ▇ cursor position.

　　　　　　　　Always input ⏎ (CR) to end.

　　　　　　　　　0 to 255 ⏎　: Ends the sub command mode after a number has been input.

　　　　　　　　　　+, −　: Increases/decreases the data by one step.

　　　　　　　UP1 to 9, 0　: Increases the current data by 1 to 10 steps.

　　　　　　　DW1 to 9, 0　: Decreases the current data by 1 to 10 steps.

　　　　　　　　　　RES　: Defaults the adjustment value (factory setting).

　　　　　　　　　　　⏎　: Ends the sub command input mode.

　　　• The changed value will be memorized the last.

　　　(Example) COL ⏎ UP0 ⏎ : Increases the color compensation value by 10 steps.

(5) Tint adjustment [TNT command]

Input : TNTd₁d₂d₃⏎

Explanation: Corrects the tint of the NTSC input board.

        $d_1d_2d_3$: Compensation value 0 to 255

        TNT? ⏎ : Help display

        TNT ⏎ : Displays the current value and moves to the sub command mode

      • To execute this command, it is necessary to set the adjustment mode by AJYC. (Refer to the AJYC command.)

      • If data input is skipped, the sub command input mode is set after the data is displayed. The sub command mode is the same as with the COL command.

      • The changed value is memorized the last.

          (Example) TNT ⏎   Indicates the current tint value.

                  128

                  ⏎

6. Controls the panel switch function

(1) To set the manual mode [MNL command]

(2) To set the remote mode [RMT command]

Input : MNL ⏎, RMT ⏎

Explanation :• Manual mode   : Makes the following switch functions effective.

          ① Variable scan board filter on/off switch

          ② VBS/ Y/C select switch

          ③ MODE switch (The RESET button is required.)

          The manual mode is set at POWER ON (or RESET button).

      • Remote mode   : Mode in which the above switching setting are selected via the RS-232C line. In this case, the above switch states are ignored.

          The settings which can be switched by the remote mode are as follows.

            • Optional RGB board FILTER ON/OFF switching

                Refer to the DSY and DSN commands (RMD-V3020)

            • V IN (Composite video/YC separate) switching

                Refer to the CIC and YIC commands.

            • V OUT output format (MODE) switching

                Refer to NT, NTR, NTD commands.

(3) To select composite video input [CIC command]

Input : CIC ⏎

Explanation :• Select the composite video input of NTSC input board.

      • This command is executed in the remote mode. It is ignored in the manual mode. (Refer to the RMT command.)

(4) To select YC separation input [YIC command]

Input : YIC ⏎

Explanation :• Selects the Y/C separation input of the NTSC input board.

      • This command is executed in the remote mode. It is ignored in the manual mode. (Refer to the RMT command.)

(5) To set the output to the NTSC mode [NT command]

(6) To set the output to standard RGB mode [NTR command]

(7) To set the output to the double-speed RGB mode [NTD command]

Input :   NT ⏎, NTR ⏎, NTD ⏎

Explanation : • NT   : Sets the NTSC input mode.
                           H   : 15.734 kHz
                           V   : 59.94 Hz
                           Composite video, Y/C output
               • NTR : Sets the standard speed RGB mode.
                           H   : 15.734 kHz
                           V   : 59.94 Hz
               • NTD : Sets the double-speed RGB mode.
                           H   : 31.469 kHz
                           V   : 59.94 Hz
               • This command is executed in the remote mode.
                 It is ignored in the manual mode. (Refer to the RMT command.)

(NOTE)
With the RMD-V2550U, only standard speed input is possible.

(8) Optional variable scan board adjustment mode settings [:A command]

Input :   : A ⏎

Explanation: • Used when adjusting the optional variable scan board (RMD-V3020).
              • To exit the adjustment mode, omit the parameters and input :⏎.
              • For details on adjustments, refer to "VS Board Command Reference" on the following pages.

8. DEMO PATTERN SETTINGS AND CAUTIONS

The MVP does not have an RMD-V3216 type DEMO switch, but 2x2 enlarged screen automatic display is possible by reading the input selector switch (OPTION/V IN) when the power is turned on and executing the command corresponding to that setting.
Because of this, upon shipment from the factory command examples for displaying the MVP 2x2 enlarged screens have been written into the demonstration switch No. 8 and No. 9 areas, which were user program areas on the RMD-V3216.
Switch No. 8 contains the command example for displaying 2x2 enlarged screens for the OPTION input picture (A input).
Switch No. 9 contains the command example for displaying 2x2 enlarged screens for the V IN input picture (C input).

2x2 enlarged screens may not be displayed if the contents of demo No. 8 and demo No. 9 are replaced. If this happens, reset the factory defaults.
The commands written into the set upon shipment from the factory and the procedure for writing the commands are described below.

```
!          : Start the command interpreter and input the following commands.
&NO011     : Matrix screen number setting ........ Set VOUT1 matrix coordinate to 11.
&NO121     : Matrix screen number setting ........ Set VOUT2 matrix coordinate to 21.
&NO212     : Matrix screen number setting ........ Set VOUT3 matrix coordinate to 12.
&NO322     : Matrix screen number setting ........ Set VOUT4 matrix coordinate to 22.
[8         : Write in the command example for 2x2 enlargement of the A input to demonstration switch No.
              8.
W3
M11A22
]
[9         : Write in the command example for 2x2 enlargement of the C input to demonstration switch No. 9.
W3
M11C12
]
```

End.
The RM-V1000NU's internal MVP assembly (AWU1014-) uses slots A and B, but this set uses slots A and C.
Note that because of this the M command setting is different.

9. INSTALLING AND REMOVING BOARDS

For your safety ⚠

● Be sure to turn the power off before installing and removing boards.
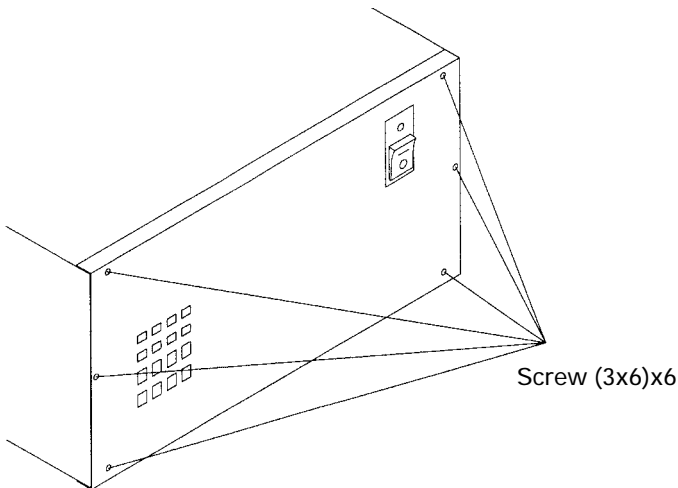
<Installation procedure>
① Remove the screws from the front panel, then open the front panel. (Fig. A)
② Insert the board gently along the rails.
   Refer to the board layout for the positions for inserting the boards.
③ Press the ▨ part of the white plastic part strongly with a finger and insert the board fully to the back. (Fig. C)
* The board may not go fully to the back if pressed on the metal part.
④ Fasten with the flanged screws (3x6). (Fig. C)
⑤ Set the front panel back in place.

<Removal procedure>
① Remove the front panel.
② Remove the screws fastening the board to the removed. (Fig. C)
③ Lift the ejectors indicated with white arrows. (Fig. B)
④ Gently draw out the board along the rails.
⑤ Set the front panel back in place.

(Fig. B)

(Fig. A)

Screw (3x6)x6

(Fig. C)

<Board layout>

Lane exclusively for control boards → [diagram] L1 ← Insertion lane
Lane exclusively for option boards → L2 ← Insertion lane
Lane exclusively for input boards → L3 ← Insertion lane
Lane exclusively for output boards → L4 ← Insertion lane

Power unit
Only service personnel should touch this.

<Relationship between board insertion lanes and rear panel connectors>
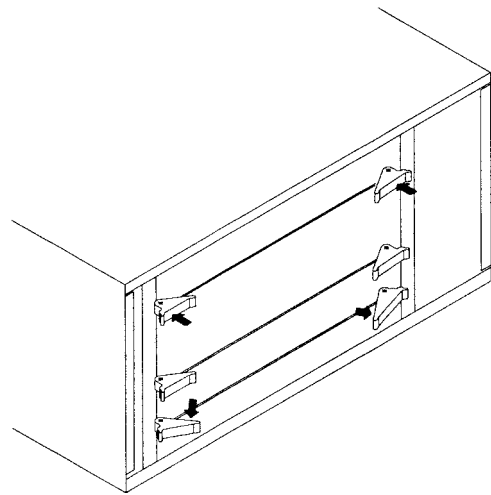
Board insertion lane Rear panel connector (refer to the diagram of the rear panel on page 18)

L2 ↔ OPTION
L3 ↔ V IN
L4 ↔ V OUT

The board insertion lanes and rear panel connectors are paired as shown above.

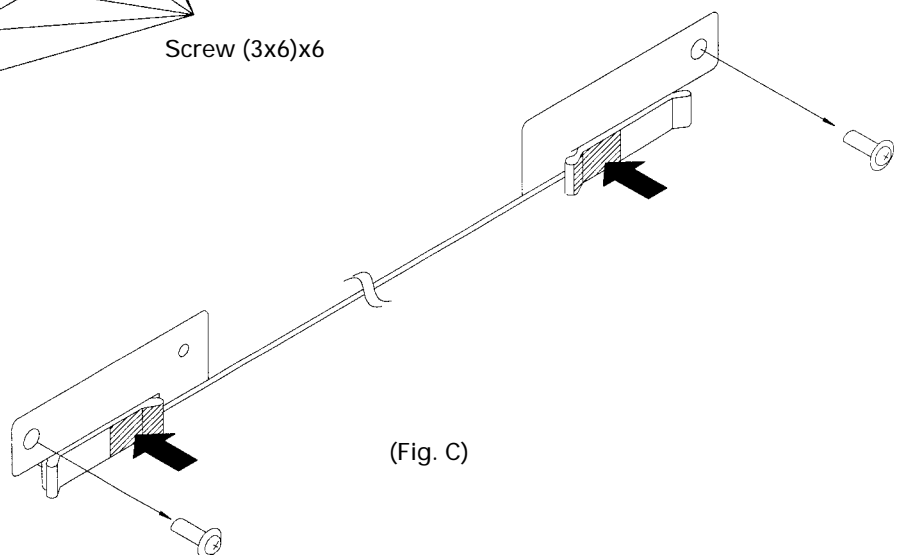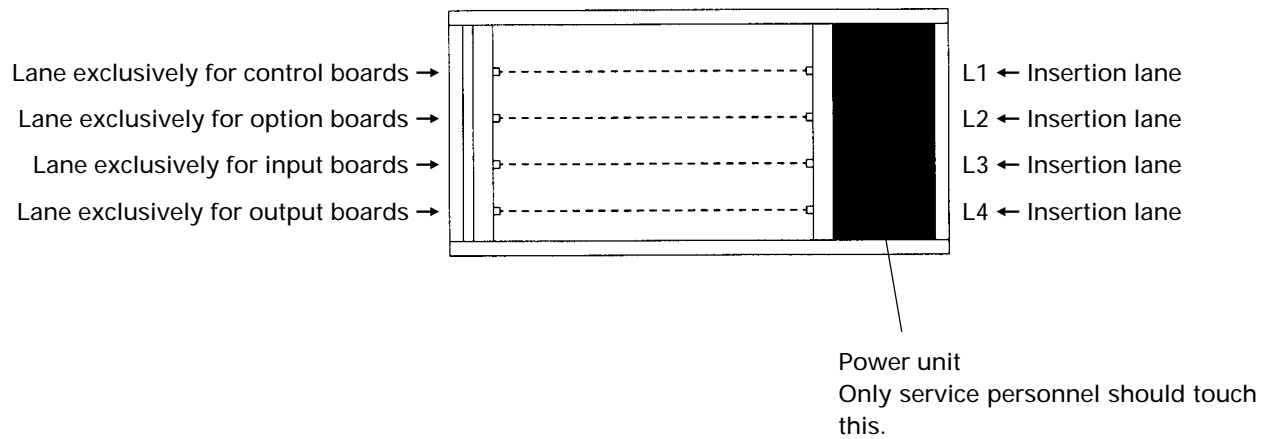# 10. RMD-V3020 COMMAND REFERENCE

(1) Outline of the RMD-V3020

- Introduction

  The RMD-V3020 is an input board (hereafter referred to as VS board) which supports variable scanning for inputting images of computer (hereafter referred to as PC) to the MVP.

Horizontal frequency	: 24 kHz to 35 kHz
Vertical frequency	: 55 Hz to 72 Hz
Dot clock	: Up to 35 MHz
Signal	: Non-interlace signal (The HDTV, 15 kHz RGB signal will not be displayed because it is interlaced.)

- Basic functions

  With the VS board, standard PC signal information is preset in the memory. When the PC signal is input to the MVP, the images are automatically output in the best state through this board after the model has been discriminated. (For details of the preset models, refer to the M commands of the VS board described later.) Although non-preset models must also be adjusted using general data, images can be output temporarily and these models are compatible with recent PCs, accelerator boards with various resolutions. (Refer to Mode 99 described later.)

  Automatic detection cannot be performed but a user-presetable area for 31 models is provided. This enables the data of unknown models to be registered and used in the same way as preset model data.

- Precautions in use

  In some cases, problems may occur when communication is carried out with the MVP at 2400 bps in the adjustment of the VS board, etc.

- VS board adjustment mode

  In the communication state with the MVP, the VS board adjustment mode can be set by inputting :A.

(2) VS board command rules

0.   Symbols

aaa   : Command consisting of 3 alphabet letters
ddd   : Basic commands : Decimals between 0 to 255 consisting of 1 to 3 digits. Can start with 0.
             Exceptional commands : Depends on each command.
xxx   : Special data. UP0 to UP9, UPF, DW0 to DW9, DWF, RES.
hh   : 2-character hexadecimals between 00 and FF.

1.   Basic commands

・ Executed commands

  aaa   : Executes and ends.
     ARS, DSN, DSX, DSY, FZN, FZY

・ Displayed commands

  aaa   : Displays and ends.
     FRQ, TBL, STS, VER

・ Numerical commands

  aaa   : Displays and sets sub command state.
  aaaddd : Performs immediate settings, displays, and sets sub command state.
  aaaxxx : Performs special settings, displays, and sets sub command state.
     TRK, RGN, GGN, BGN, CNT, RLV, BLV, BRT, BKL, HPS, VPS, HWN, VWN, HWD, VWD, HFD

・ Sub commands

  ddd   : Performs immediate settings, and displays.
  xxx   : Performs special settings, and displays.
  +   : Performs UP1 special settings and updates display.
  −   : Performs DW1 special settings and updates display.
         : Ends sub command state.

Other commands can be input even if the sub command state has not been ended. In this time, the sub command input mode will be canceled automatically.

・ Errors

When aaa contains an error, the "COMMAND ERROR" state is set and the current value is displayed. When ddd contains characters other than 0 to 9, or is outside the 0 to 255 range, the "DATA ERROR" state is set and the current value is displayed. When xxx contains an error, the "DATA ERROR" state is set and the current value is displayed.
When an error occurs in the sub command state, the "SUB COMMAND ERROR" state is set and the current value is displayed.

2. Exceptional commands

• Model data commands

    TBL   : Displays the current model data table.

    TBLhh   : Displays the hh model data table.

    M   : Displays the current model number.

    Mhh   : Sets the hh model number.

    Fhh   : Sets the hh model number data to the initial value.

When the hh model data does not exist, "**NO DATA**" is displayed. When hh contains characters other than 0 to 9, a to f, and A to F, "DATA ERROR" is set.

• Frequency commands

    HFQ   : Displays the current model determination H frequency.

    HFQRES   : Sets the current model determination H frequency to the initial value, and displays it.

    HFQddd.ddd : Changes and displays the current model determination H frequency. (Take note of the decimal point.)

    VFQ   : Displays the current model determination V frequency.

    VFQRES   : Sets the current model determination V frequency to the initial value, and displays it.

    VFQddd.ddd : Changes and displays the current model determination V frequency. (Take note of the decimal point.)

In the case of frequency commands, both the integer and decimal of ddd.ddd must be decimal 3 digit numbers. Numbers between 000.000 to 999.999 can be input.

When d is a character other than 09, when the number of digits is wrong, or the decimal point is at the wrong place, "DATA ERROR" is set, and the current model determination frequency is displayed.

• Line conversion command

    LCV   : Displays the current model line conversion rate.

    LCVRES   : Sets the current model line conversion rate to the initial value, and displays it.

    LCVdddd : Changes and displays the current model line conversion rate

In the case of line conversion commands, dddd must be a decimal 4 digit number, and the first two digits must be 0015 and the last two must be above 00 and below the first two digits. If d is a character other than 09, or the number of digits is wrong, "DATA ERROR" is set, and the current line number conversion rate is displayed.

Both 0000 and 0101 are not convertible.

• Line number command

    VLN   : Displays the current model determination line number.

    VLNRES   : Initializes and displays the current model determination line number.

    VLNddd   : Changes and displays the current model determination line number.

In the case of the line number command, ddd must be a decimal 3 digit number. Numbers between 000 and 999 can be input.

When d is a character other than 09, or when the number of digits is wrong, "DATA ERROR" is set, and the current line number is displayed.
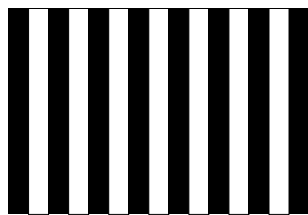
(3) Tracking adjustment [TRK command]

Input : TRKd$_1$d$_2$d$_3$

Explanation: • d$_1$d$_2$d$_3$: Compensation data 0 to 254
• Eliminates lateral vibration of displayed characters, shaking, and noises.

• A vertical line pattern in which the black and white lines change every dot as shown below is the ideal for adjustments.

(4) Contrast adjustment [CNT command]

Input : CNTd$_1$d$_2$d$_3$

Explanation: • d$_1$d$_2$d$_3$: Compensation data 0 to 254
• Use this command to adjust the contrast.
• Use this command to adjust so that the contrast of the images produced by the MVP matches the contrast of the actual images of the computer.
• Tracking may deviate in some cases when CNT adjustment is performed after TRK adjustment. After adjusting CNT, adjust TRK.

(5) R, G, B gain adjustment [RGN, GGN, BGN commands]

Input : RGNd$_1$d$_2$d$_3$, GGNd$_1$d$_2$d$_3$, BGNd$_1$d$_2$d$_3$

Explanation: • d$_1$d$_2$d$_3$: Compensation data 0 to 254
• GGN : Green gain adjustment
RGN : Red gain adjustment
BGN : Blue gain adjustment
• Use this command to adjust so that the white balance of the images produced by the MVP matches the white balance of the actual images of the computer.
• Tracking may deviate in some cases when gain adjustment is performed after TRK adjustment. After adjusting gain, adjust TRK.

(6) Brightness adjustment [BRT command]

Input : BRTd$_1$d$_2$d$_3$

Explanation :• d$_1$d$_2$d$_3$: Compensation data 0 to 254
• Use this command to adjust the brightness.
• Use this command to adjust so that the brightness of the images produced by the MVP matches the brightness of the actual images of the computer.
• Tracking may deviate in some cases when brightness adjustment is performed after TRK adjustment. After adjusting brightness, adjust TRK.

(7) B, R clamp adjustment [BLV, RLV commands]

Input :   BLV$d_1d_2d_3$, RLV$d_1d_2d_3$
Explanation : • $d_1d_2d_3$: Compensation data 0 to 254
              • BLV   : Adjusts the B clamp level.
                RLV   : Adjusts the R clamp level.
              • Use this command to adjust so that the white balance of the low light side of the images produced by the MVP matches that of the actual images of the computer.
              • Tracking may deviate in some cases when clamp level adjustment is performed after TRK adjustment. After adjusting the clamp level, adjust TRK.

(8) Blanking window level adjustment [BLK command]

Input :   BLK$d_1d_2d_3$
Explanation : • $d_1d_2d_3$: Compensation data 0 to 254
              • Adjusts the bright level of the blanking window.
              • Use to adjust the VS board picture frame and prevent burning.
              • Adjust the blanking window position and width using HWN, HWD, VWN, and VWD.

(9) Horizontal, vertical direction screen display position adjustment [HPS, VPS commands]

Input :   HPS$d_1d_2d_3$, VPS$d_1d_2d_3$
Explanation : • $d_1d_2d_3$: Compensation data 0 to 254
              • HPS   : Moves the screen horizontally.
                VPS   : Moves the screen vertically.
              However, the blanking window does not move and only the screen inside the window moves. The moving range of the screen is not limited to the blanking window.

Monitor frame

Blanking window (Does not move)

PC image

Figure: Example of HPS Command Execution

(Note)
HPS, HWN, and HWD are commands to change reading and writing timings of the image memory, and are mutually correlated. For this reason, Each of these three commands has a limited value without varying the 0 to 255 range.
VPS, VWN, and VWD are also the same.
When the above command become the limited values, the image blinks three times.

(10) Horizontal, vertical blanking window position adjustment [HWN, VWN commands]

Input :   HWN$d_1d_2d_3$, VWN$d_1d_2d_3$
Explanation : • $d_1d_2d_3$:Compensation data 0 to 254
     • HWN :Adjusts the H blanking window position.
       VWN :Adjusts the V blanking window position.
       However, the picture inside the blanking window also moves.

Figure: Example of HWN, VWN Command Adjustment

(Note)
HPS, HWN, and HWD are commands to change reading and writing timings of the image memory, and are mutually correlated. For this reason, Each of these three commands has a limited value without varying the 0 to 255 range.
VPS, VWN, and VWD are also the same.
When the above command become the limited values, the image blinks three times.

(11) Horizontal, vertical blanking window width adjustment [HWD, VWD commands]

Input :   HWD$d_1d_2d_3$, VWD$d_1d_2d_3$
Explanation : • $d_1d_2d_3$: Compensation data 0 to 254
     • The pedestal of the video signal is masked by blanking which can adjust the bright level.
     • HWD   : Adjusts the H blanking window width.
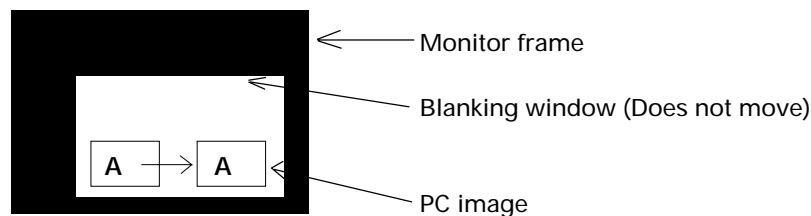   VWD   : Adjusts the V blanking window width.
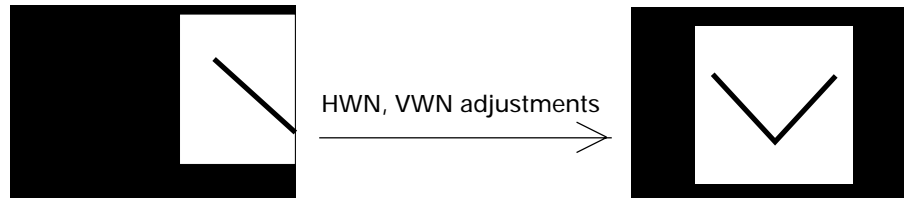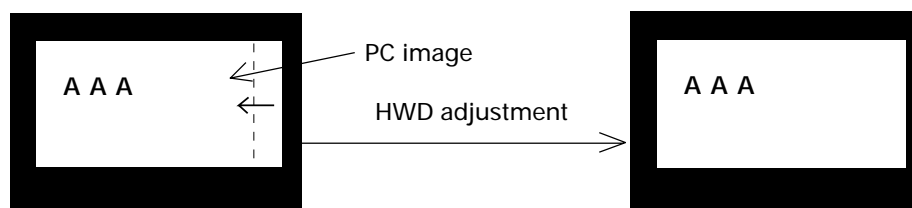

Figure: Example of HWD Execution

(Note)
HPS, HWN, and HWD are commands to change reading and writing timings of the image memory, and are mutually correlated. For this reason, Each of these three commands has a limited value without varying the 0 to 255 range.
VPS, VWN, and VWD are also the same.
When the above command become the limited values, the image blinks three times.

(12) Full dot number compensation [HFD command]

Input :   HFDddd

Explanation :• $d_1d_2d_3$:Compensation data 0 to 254

         • Corrects the preset sampling clock.

         • Vertical bit lines can be erased by executing the HFD command.

         • The HFD and HPS data are correlated and have limited values.
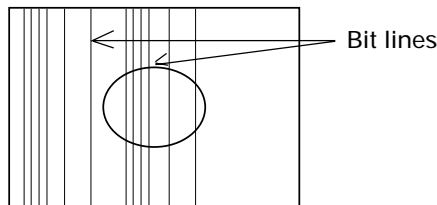
Figure: Bit Lines which can be Erased by HFD Execution

(13) Freeze frame Y:ON N:OFF [FZY, FZN commands]

Input :   FZY, FZN

Explanation :• Continuously outputs the image the moment the FZY is executed. This is canceled by FZN.

         • Whether the state is FZY or FZN can be determined by executing the STS command.

         • Do not perform position adjustments in the FZY state.

(14) Vertical filter ON/OFF [DSY, DSN, DSX commands]

Input :   DSY, DSN, DSX

Explanation :• Converts the vertical line number so that the computer images can be displayed fully on the monitor.

         • The conversion rate preset by the LCV command can be changed. (Refer to LCV command.)

         • Whether the state is DSY or DSN can be determined by executing the STS command.
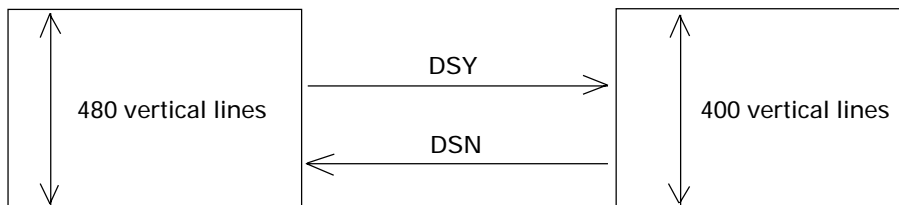
Figure: Example of DSY and DSN Executions (MAC 6-5 Conversion Example)

         • The DSX is a command which makes the V.FIL switch on the rear of the MVP effective.

(15) Vertical compression filter conversion rate input [LCV command]

Input : LCV$d_1d_2d_3d_4$

Explanation :
- d_1d_2=00 to 15 (Add 0 before all numbers below 9) Vertical direction rate before conversion
- d_3d_4=00 to 15 (Add 0 before all numbers below 9) Vertical direction rate after conversion
  Due to the use of a compression filter, the condition is $d_1d_2 > d_3d_4$.
  Both LCV0000 and LCV0101 are not convertible.
- Directly changes the vertical filter conversion rate of the data table of the model using the VS board currently.
- When the conversion rate is changed for DSY, the image compressed by the new conversion rate will be output.
  (Example)
  : LCV0605   Set 6–>5 conversion

(16) Program ROM version display [VER command]

Input : VER

Explanation :
- Indicates the version of the program ROM mounted in the current VS board.
  (Example)
  : VER
  PROGRAM VERSION=BXY1004-X VX.XX 199X.XX.XX

(17) To indicate the current function setting [STS command]

Input : STS

Explanation :
- Displays the model data No., selected state (auto or forced), vertical filter ON, OFF, and freeze ON, OFF selected by the VS board currently.

  (Example)
  : STS
  STATUS=DSY, FZN
  MODEL NO.=09 AUTO

  : STS
  STATUS=DSY, FZN
  MODEL NO.=03 FIXED

Autolocks to PC9801 with the left display, indicates vertical filter ON, freeze OFF.

Forcible locks the Macintosh with the left display, indicates vertical filter ON, freeze OFF.

(18) To select preset model [M command]

Input : Mh_1h_2

Explanation :• Refer to "VS Board Model Selection" described later for the VS board model selection.
          • Forcible locks the model data preset.
          Model data No.

h_1	h_2	
0	0	Discriminates the model.
0	1	VGA (640 x 480)
0	2	IBM-PC (EGA emulation)
0	3	Macintosh 13-inch monitor mode (Standard)
0	4	Macintosh 13-inch monitor mode (RasterOps type)
0	5	Macintosh 13-inch monitor mode (Power Mac)
0	6	FM-R50
0	7	IBM Think Pad 230C
0	8	X68000
0	9	NEC PC9801 (640 x 400 mode)
1	0	
		Unused area (Do not specify using the M command.)
2	7	
2	8	
		User preset area (Use only with the M command.)
5	8	
9	9	Models other than above.

This model data can be locked only using the M command.
The data range which can be preset by the user is 28 to 58. 28 to 58 contains the VGA data (same as 01) at shipment.
Refer to Mode 99 mentioned later for details of model No. 99.

(19) Model fresh [F command]

Input : Fh_1h_2

Explanation : • Sets back to the model data preset at shipment.

Model data No.

h_1	h_2	
0	0	Auto
0	1	VGA (640 x 480)
0	2	IBM-PC (EGA emulation)
0	3	Macintosh 13-inch monitor mode (Standard)
0	4	Macintosh 13-inch monitor mode (RasterOps type)
0	5	Macintosh 13-inch monitor mode (Power Mac)
0	6	FM-R50
0	7	IBM Think Pad 230C
0	8	X68000
0	9	NEC PC9801 (640 x 400 mode)
1	0	
		Unused area (Do not specify using the M command.)
2	7	
2	8	
		User preset area
5	8	
9	9	Models other than above.

This model data can be locked only using the M command.

The data range which can be preset by the user is 28 to 58. 28 to 58 contains the VGA data (same as 01) at shipment.

Refer to Mode 99 mentioned later for details of model No. 99.

(20) Measurement data display [FRQ command]

Input : FRQ

Explanation : • Displays the horizontal frequency, vertical frequency, and full line number of the personal computer connected to the MVP currently. Use as reference when inputting the data of models whose details are unknown.

(Example)
: FRQ
fH=24 kHz, fV=56.4 Hz, 1V=440 LINE.

(21) Model table reference [TBL command]

Input :   TBLh_1h_2

Explanation : hh model data No. (Refer to the M command for the model data No.)

          • Displays the data table of the model data h_1h_2 model.

          When h_1h_2 is omitted, displays the data table of the model connected to the VS board currently.

          (Example)

            : TBL

            MODEL NO.=09 AUTO (Indicated autolocked to PC98.)

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
C140	09	◎	48	30	08	48	01	45	06	40	38	20	FF	FF	FF	FF
C150	FF	05	64	32	04	40	00	30	04	00	11	FF	FF	FF	FF	FF
C160	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
C170	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF

          The address of ◎ is:

            C140 (Left number) +1 (Top number)=C141 address.

          This address is considered as the hexadecimal address conforming to C140.

          The relative addresses on the table are as follows. (Not model data.)

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F

The relative address and data are as follows.
However, relative addresses 20 to 3F are the system reservation range.

Relative ADDR	Data Contents	Relative ADDR	Data Contents
00	Model data No.	10	Reservation
01	Horizontal frequency	11	Vertical frequency
02	NNN.NNN kHz	12	NNN.NNN kHz
03	(BCD 6 digits) **Note 1**	13	(BCD 6 digits)
04	Total horizontal dots	14	Total vertical line number
05	(BCD 4 digits)	15	(BCD 4 digits)
06	Horizontal effective start position	16	Vertical effective start position
07	(BCD 4 digits)	17	(BCD 4 digits)
08	Horizontal effective dot number	18	Vertical effective line number
09	(BCD 4 digits)	19	(BCD 4 digits)
0A	Clamp head	1A	Line conversion rate **Note 4**
0B	Clamp period	1B	
0C	Gain upper limit	1C	Reservation
0D	Clamp upper limit	1D	
0E	Sync method **Note 2**	1E	PLL gain
0F	Sync polarity **Note 3**	1F	Reservation

Note 1 : For example, taking the PC98 table on the previous page as an example, as the relative addresses 01, 02, and 03 contain data 02, 48, and 30, the PC98 horizontal frequency setting value is 24.83 kHz.

Note 2 : FF when the method is not limited.

Note 3 : FF when the polarity is not limited.

Note 4 : If the relative address data is:

    65 : Indicates 6-5 conversion

    A7 : Indicates 10-7 conversion.

(22) Horizontal frequency input [HFQ command]

Input : $HFQd_1d_2d_3.d_4d_5d_6$

Explanation : • Directly changes the horizontal frequency of the model data table used for the VS board currently.

      • Input the frequency using 6-digit decimal numbers. When data input is omitted, the horizontal frequency on the current model data table is displayed.

      • Refer to "Using Methods of HFQ, VFQ, VLN" described later on the using methods.

        (Example)

        HFQ035.123 ⟵————————————————— Input 35.123 kHz

        (Take note to input 0 at first.)

Although numbers outside the horizontal frequency specification range (24.0 kHz to 35.0 kHz) range of this board can be input, they cannot be used as preset data.

(23) Vertical frequency input [VFQ command]

Input :   VFQ$d_1d_2d_3.d_4d_5d_6$

Explanation :• Directly changes the horizontal frequency of the model data table used for the VS board currently.

        • Input the frequency using 6-digit decimal numbers. When data input is omitted, the vertical frequency on the current model data table is displayed.
        Although numbers outside the vertical specification range (55.0 kHz to 72.0 kHz) range of this board can be input, they cannot be used as preset data.
        • Refer to "Using Methods of HFQ, VFQ, VLN" described later on the using methods.
            (Example)
              VFQ060.123 ⟵————————————— Input 60.123 kHz
                  (Take note to input 0 at first.)

(24) Vertical full-line input [VLN command]

Input :   VLN$d_1d_2d_3$

Explanation :• 3-digit decimal numbers between 000 to 999 can be input for ddd.
        • Directly changes the vertical full line number of the model data table used for the VS board currently.
        • Refer to "Using Methods of HFQ, VFQ, VLN" described later on the using methods.

(25) All reset [ARS command]

Input :   ARS

Explanation :• Sets back the adjustment data, etc. memorized by the VS board to the shipment values.
        • As all the data registered by the user are set back to the initial values, use this command carefully.

11. MODE 99

The VS board contains preset data for autolocking 9 computer main models at shipment.
However, looking at the recent PC market is taken into consideration, it is not possible to incorporate preset data in all models due to the diversification of manufacturers, models, and graphic mode, etc.
For this reason, the variable scan board has been forcibly locked to the mode called model data 99 for personal computers without preset data in order to output the personal computer screen to the monitor.
Consequently, it can deal with many of the 24 kHz to 35 kHz personal computers (the upper limit for the dot clock is 35 MHz).
However, this model No. 99 has several restrictions in order to deal with numerous personal computers.

- When the HFD command to change the sampling clock exceeds 35 MHz, the image may become blur.
  Use 99 without moving HFD as much as possible.
- At the point the personal computer locked to model No. 99, dusts may appear at the top and bottom as shown in the figure.

Dusts appearing at the top and bottom.
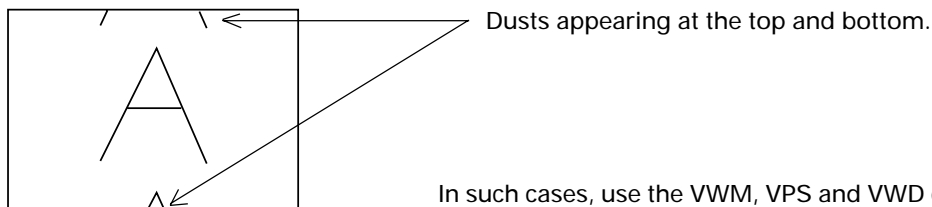
In such cases, use the VWM, VPS and VWD commands to mask the dirt.

- The RGB board is the upper limit at which the dot clock 35 MHz ensures performance.
  The following is a simple calculation method of the dot clock.
  Dot clock (Hz)=Effective dot number x Horizontal frequency (Hz) x 1.35
- Use Mode 99 to output images temporarily. When used, it is recommended that the user preset area (No. 28 to 58) be changed and used after checking the frequency, etc. using FRQ command.
- The G on Sync model is not locked in the Mode 99.

12. VS BOARD MODEL SELECTION

```
        ┌──────────────────┐
        │  PC signal input │
        └──────────────────┘
                 │
                 ▼
        ┌──────────────────┐   NO    ┌──────────────────┐      NO
        │  Preset PC?      │────────▶│ Locked in Mode 99?│──────────────────┐
        │  (01 to 09)      │         └──────────────────┘                   │
        └──────────────────┘              │ YES                             │
                 │ YES                     ▼                                 ▼
                 │              ┌──────────────────┐              The model may be outside
        ┌────────────────┐     │ Output in Mode 99│              the application range.
        │  Auto locked   │     └──────────────────┘
        └────────────────┘              │
                 │              ┌──────────────────────┐
                 │              │ Check  frequency,    │
                 │              │ line number using    │
                 │              │ FRQ command          │
                 │              └──────────────────────┘
                 │                       │
                 │              ┌──────────────────────┐
                 │              │ Lock preset model data│
                 ▼              │ using M command.       │
        ┌────────────────┐     └──────────────────────┘
        │ Frame,  color  │◀──────────────
        │ adjustment     │
        └────────────────┘
               When using the Mode
               99 data as it is.
```
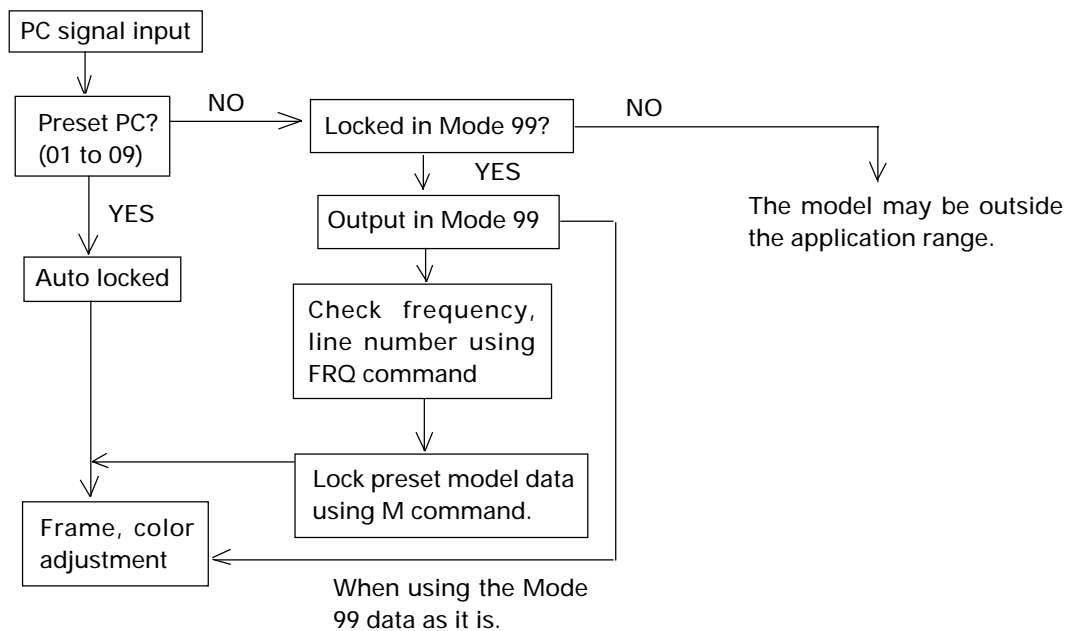
Description

With the VS board, first the input PC frequency and full line number are measured. Next, if there are preset models which have three matching measuring data, it is determined that these models are connected and they are set into the autolock state.

In the autolock state, 01 AUTO is displayed by the STS command.

If there exists no preset model data corresponding to the measuring data, all models are autolocked to Mode 99. (Refer to "MODE 99".)

Take note that there are DOS/V personal computers which have 640 effective dot number and 480 effective line number but a different full line number (526 or 524) from the standard VGA 525. In this case, their models are autolocked to Mode 99.

As the frequency is close to the VGA, when the VS board is forcible locked to the VGA by M01 and data is output, the image frame, etc. will be optimum. In this way, the M command is used when using the preset data as substitute data.

13. USING METHODS OF HFQ, VFQ, VLN

There is a need to autolock unpreset models without using the Mode 99 accoridng to the state in which the VS board is used.

The procedure is as follows.

1. Input a PC without the preset data.
2. Autolock to 99.
3. Check the frequency and full line number using the FRQ command.
4. Forcible lock using the M command to the model with a similar frequency.
5. Input the checked data using HFQ, VFQ, and VLN.
6. Execute M00 and check that it has been auto locked.

Unpreset models can also be autolocked using the above procedure. To set back the original state, use the F command.

14. SELECTING THE SYNC SIGNAL

When adjusting the VS board, care must be taken regarding the relation of the priority order of the sync signal.

Order of selecting the sync signal

The priority order for selecting the sync signal of the VS board is

Separate sync > composite sync > Green on sync.

However, if the sync signal of a certain method is selected once according to the connection and power ON/OFF order, even if sync signals with a higher priority order than that sync signal are connected later, sync selection will not be switched.

In this case, however, the priority order will be selected again when the power of the converter is turned on again.

Frame for Sync Signal

The horizontal frame values are saved according to the sync signal currently selected.

For this reason, the horizontal frame may deviate according to the type of sync signal even with the same computer.

(Example)

When models with both the composite sync and green on sync are connected (Frequently with Macintosh)

① Connect cables G, B, R, and CS in this order with the power of the input personal computer and converter on.　— — — — — — —≫　The green on sync is selected.

② After connecting the cable with the power of the input personal computer on, turn on the power of the converter.　— — — — — — —≫　The composite sync will be selected.

When frame adjustment is carried out in the ① state, ② state is set when the power is turned on the next time, meaning that the frame deviates.

It is necessary to set state ② at all times so that the same sync signal is selected during both adjustments and use.